



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
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WASHINGTON DC 20350-2000

OPNAVINST 9110.1D
N97
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OPNAV INSTRUCTION 9110.1D

From: Chief of Naval Operations

Subj: SUBMARINE TEST AND OPERATING DEPTHS

1. Purpose. To implement policy concerning submarine test and maximum operating depths, the conduct of test and deep dives by submarines, and use of escorts. This instruction is being reissued with a new date, updated version and signature authority to meet Chief of Naval Operations' (CNO) age requirement for Office of the Chief of Naval Operations instructions.

2. Cancellation. OPNAVINST 9110.1C.

3. Scope and Applicability. The provisions of this instruction are applicable throughout the U.S. Navy, in particular units who operate, utilize, and manage a submarine operating within a prescribed operating cycle and or operating interval.

4. Definitions

a. Test Depth. The depth to the axis of the hull prescribed by the detail and special specifications for building the particular submarine, to which the ship is tested by actual submergence.

b. Collapse Depth. The depth at which it is calculated collapse of the hull will occur. The margin between test depth and collapse depth can be expected to decrease as the age of the submarine increases or if the submarine is subjected to unusual strain.

c. Maximum Operating Depth. The depth of the axis of the hull for a particular submarine which is authorized by Commander, Submarine Forces (COMSUBFOR) upon the recommendation of Commander, Naval Sea Systems Command (COMNAVSEASYS COM), as the depth not to be exceeded in operations. This depth is normally the test depth, but may be reduced in specific cases.

NOTE: Specification of depths greater than 800 feet is classified confidential.

5. Discussion. The factors in subparagraphs 5a through 5c are pertinent:

a. The fact that a submarine may on one occasion successfully submerge to a depth in excess of maximum operating depth without serious leaks or damage is not surety of its being able to submerge to the same depth without such leaks in the future.

b. The collapse depth and the corresponding factor of safety designed into submarines are not precisely known. The test depths which are prescribed for the various classes of submarines provide adequate margins of structural safety since the test depth for U.S. submarines has traditionally been established at two-thirds of theoretical hull collapse depth, thus providing a safety factor of 1.5.

c. The safety of a submarine operating at or near test depth involves many variables, among which are speed, angle, state of training, and material condition of the ship. These and other pertinent factors should be taken into consideration in making depth excursions.

6. Policy. In view of the foregoing, the policy in subparagraphs 6a through 6h, in regard to deep submergence of submarines, is effective.

a. The CNO will prescribe the design test depth as a characteristic for all new submarine class designs. The maximum operating depth will usually be the design test depth. The CNO will also prescribe a maximum operating depth as a variance from class design test depth for individual hulls of a submarine class upon the recommendation of COMNAVSEASYS COM when a discrepancy in design or construction so dictates.

b. COMSUBFOR may prescribe a maximum operating depth limit, less than test depth, when material conditions or other considerations so dictate. The CNO and COMNAVSEASYS COM will be kept informed of such deviations.

c. Submarines should not intentionally exceed the authorized depth limitations. In hostile situations when the tactical situation necessitates, the submarine commanding officer may determine that the increased risks associated with exceeding maximum operating depth are outweighed by risks involved in remaining at or above the maximum operating depth limit. In such a situation, depths in excess of maximum operating depth may be ordered but the degree of excursion beyond this depth must be held to the absolute minimum dictated by and consistent with the immediate tactical situation at hand. In making such a decision, all factors affecting hull strength, personnel reliability, and reliability of depth control, propulsion power, and recoverability must be considered. Excursions below test depth impose stress cycles which will shorten the fatigue life of the hull and all sea pressure systems.

d. All submarines operating within the prescribed operating cycle and or operating interval are required to conduct a deep submergence test to test depth or authorized maximum operating depth before combined acceptance trials, in the case of new construction, converted, or reactivated submarines. A dive to test depth or authorized maximum operating depth will be made at intervals of not more than 1 year while in full commission. In addition, submarines in commission are required to conduct a similar test whenever they have undergone extensive work involving pressure hull openings or alterations which may materially affect their ability to withstand external pressure. The new construction, or post repair deep submergence test, should be conducted in a water depth which is, as nearly as practicable, equal to the maximum operating

depth desired and in the presence of an escort vessel equipped to communicate with the submarine. Reliable communications should be established prior to such test dives and maintained throughout the duration of the dive. If communications are lost, the test should be terminated until communications can be re-established.

e. In the case of submarines which have completed overhaul, conversion, or reactivation, the deep submergence test need not be conducted during the overhaul, conversion, or reactivation period if it is determined by COMSUBFOR that such deferral is desirable. In such cases, trim and tightness dives must be conducted during the overhaul, conversion, or reactivation period and the deep submergence test must be conducted before the submarine commences unrestricted operations.

f. COMNAVSEASYSCOM will provide to COMSUBFOR:

(1) Certification that the applicable submarine safety work package and necessary design reviews have been completed and that no outstanding limiting discrepancies exist, or provide a statement of any limiting discrepancies.

(2) A recommendation that the submarine be authorized unrestricted operations to design test depth or that a maximum operating depth be prescribed until limiting discrepancies are corrected.

(3) Duration of the recommended operating depth limitation or certification.

g. Escort requirements for specified situations are:

(1) An escort must be provided during the initial deep dive submergence trials for all ships completing overhaul or new construction.

(2) An escort must be provided during deep dive submergence trials for ships completing availability for repair of collision grounding damage where deformation is observed to be in the hull integrity envelope or supporting structure.

(3) The requirement for providing an escort during deep dive submergence trials upon completion of all other availabilities will be evaluated by COMNAVSEASYSCOM on a case by case basis. COMNAVSEASYSCOM will advise COMSUBFOR, in writing, whether or not an escort will be required based on the scope of work in the availability. In general, a submarine selected restricted availability or an extended repair period should not require an escort, since the work typically performed in these availabilities is limited in scope, is carefully controlled and, therefore, does not result in substantial risk of unidentified or incomplete work adversely affecting a submarine safety boundary.

h. COMNAVSEASYSCOM and type commanders must:

(1) Ensure compliance with the policies outlined.

(2) Cause instructions as deemed necessary to be published, at the appropriate level, for amplification and implementation of this policy.

7. Records Management. Records created as a result of this instruction, regardless of media and format, must be managed per Secretary of the Navy (SECNAV) Manual 5210.1 of January 2012.

8. Review and Effective Date. Per OPNAVINST 5215.17A, Office of Chief of Naval Operations, Director, Undersea Warfare (OPNAV N97) will review this instruction annually on the anniversary of its issuance date to ensure applicability, currency, and consistency with Federal, Department of Defense, SECNAV, and Navy policy and statutory authority using OPNAV 5215/40 Review of Instruction. This instruction will be in effect for 5 years, unless revised or cancelled in the interim, and will be reissued by the 5-year anniversary date if it is still required, unless it meets one of the exceptions in OPNAVINST 5215.17A, paragraph 9. Otherwise, if the instruction is no longer required, it will be processed for cancellation as soon as the cancellation is known following the guidance in OPNAV Manual 5215.1.



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Releasability and distribution:

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